v. 3, n. 7, 2023

International Journal of Biological and Natural Sciences

FLORISTIC SURVEY OF MYRTACEAE IN SEASONAL SEMIDEDECIDUAL FOREST IN THE MARINGÁ REGION

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Abstract: The present study aims to carry out a survey of Myrtaceae in remnants of Semideciduous Seasonal Forest in the Maringá region. For this purpose, there was a survey on the Species link website, a review of the material from the Herbarium of ``Universidade Estadual de Maringá`` (HUEM) and 2 field trips in forest fragments. Twenty-eight species were recorded, distributed in 8 genera (Callistemon, Campomanesia, Corymbia, Eugenia, Myrcia, Myrcianthes, Myrciaria, Plinia, Psidium and Syzygium), 7 of which are endemic to Brazil (Eugenia brasiliensis, Eugenia candolleana, Eugenia longipedunculata, Myrcia felisbertii, Myrciaria glazioviana, Myrciaria glomerata and Psidium cattleyanum). The month with the longest reproductive period is September, with 12 occurrences, presenting greater diversity of food for wild animals and pollinators. Eugenia is the genus with the highest diversity, with 10 species and Eugenia uniflora the most abundant in records, greater distribution, being recorded in almost all the remnants sampled, with longer reproductive period and with greater occurrence in the Brazilian vegetation types.
Keywords: Remnants, Atlantic Forest, Paraná.

INTRODUCTION

Biomes are large ecological areas with several interconnected ecosystems, classified by the similarity of their vegetational, climatic and faunal characteristics. Brazil has six biomes: Amazon, Caatinga, savannah, Atlantic Forest, Pampa and Pantanal [10]. The location covered by this work is contemplated by the Atlantic Forest biome, which is distributed throughout the Brazilian territory (covering about 15%), in addition to passing through areas of Argentina and Paraguay in the South and Southeast regions [13].

The Atlantic Forest Biome, presents several ecological regions and is classified as one of the five hotspots, among the 34 recognized worldwide, to cover one of the greatest biological riches in the world [19]. Among the Brazilian biomes, the Atlantic Forest biome stands out for having the highest levels of diversity ever found in tropical forests, due to the intense variations in relief and the high level of endemism, harboring more than 60% of all terrestrial species in the world. planet [18].

This biome is of great economic importance for providing essential services to the populations that live in the region, being responsible for several factors, including water production and supply, climate balance, soil protection, food production, and yet, the formation of exorbitant landscapes that favor tourism.

However, the unbridled exploitation of its resources has exterminated a large part of the natural ecosystems, making it one of the most threatened biomes on the planet, with less than 8% of its original forest remaining, distributed in small fragments [13]. In recent decades, habitat loss has drastically altered most of the Atlantic Forest, leading to the local extinction of several species.

Among the vegetation types present in the Atlantic Forest, there is the Semideciduous Seasonal Forest (FES), characterized by occurring in regions where there is a seasonality in the rainfall regime, conferring the loss of 20% to 50% of leaves in the driest season [14]. It is formed by deciduous species, with occasional patches of Araucaria angustifolia (Mixed Ombrophylous Forest).

At first, the FES covered most of the third plateau of Paraná, but currently, only a small part remains, being considered the most threatened forest in the state of Paraná and Brazil. Among the various regions located in this vegetation type, there is the Metropolitan Region of Maringá, located in the North Central mesoregion of Paraná (22º30'58"

S and 52º06'47" W), in the Third Plateau of Paraná, or also called Plateau of Guarapuava. Maringá has an estimated population of 436,472 people, with an area of approximately 487.012 km² of the 199,298.981 km² of the state of Paraná [12].

Like the other regions belonging to the FES, the Maringá region has undergone an intense process of anthropization involving deforestation for more than six decades, triggering disorderly advances in urbanization and intense agricultural activities, causing the native forests of the region to become just fragmented areas of secondary forests, capoeiras and lowlands, leaving only less than 0.5% of the natural vegetation [16]. The conservation of the FES (Atlantic Forest) in the Maringá region has been taking place progressively, based on the development of public policies that prevent its destruction, such as management plans for threatened green areas.

Despite this picture of devastation, these fragmented remnants are sources of botanical, ecological and genetic information, which can serve as a basis for conservation measures, recovery and management of these areas. This way, the fragments of the FES that remained in the region of Maringá, present a wide biological diversity, distributed in 21 green areas, being 15 ecological parks, six areas without their own law and eight remaining registered in the Ecological ICMS, among which, the Parque do Ingá, Bosque II and Horto Florestal stand out as the three main ones [16].

Myrtaceae is part of the vast botanical diversity of these remnants, being a pantropical family, emerged in the middle of the Cretaceous and comprises about 6000 species distributed in 140 genera, being widely distributed in tropical and subtropical regions of the world, with centers of diversity in South America, Australia and Asia, with low representation in Africa, occupying the third place in the world classification in diversity of tree species [30].

Myrtaceae is of extreme ecological and economic importance, due to its wide variety of species with fleshy and juicy fruits, being among the first families with the highest number in most Brazilian regions, as well as in the region of Maringá. To better understand this family, it is necessary to clarify that, previously, Myrtaceae was classified based on the characteristics of its fruits, being divided into two subfamilies: Myrtoideae those with fleshy fruits, and Leptospermoideae those with dry fruits [20]. However, studies have shown that characters such as dry or fleshy fruits emerged independently in several lineages of the family. Currently, the most adopted classification is based on molecular data, dividing Myrtaceae into two subfamilies: Psiloxyloideae and Myrtoideae [29].

In this context, among all families that inhabit the region, Myrtaceae is abundant in species and spatial distribution. Myrtaceae is among the three most abundant FES families in the Maringá region [6]. However, published studies that include the family in the remnants are still scarce, compared to other smaller families that inhabit the study site. Given its importance, the present study aims to carry out a floristic survey of the Myrtaceae family in the Semideciduous Seasonal Forest in the region of Maringá, providing ecological and phenological data, as well as information on the spatial distribution of its species in the remnants that make up the region.

MATERIALS AND METHODS

STUDY AREA

The Metropolitan Region of Maringá is located in the North Central mesoregion of Paraná (22º 30' 58" S and 52º 06' 47" W), in the Third Plateau of Paraná and in the southern portion of Brazil (figure 1). It comprises 25 municipalities with approximately 809,000 inhabitants and a territorial extension of 5,978,592 km², with Maringá as the main city [11].

In the case of soils in the region of Maringá, commonly called "terraroxa", it is a basaltic sediment, due to its volcanic origin, and clayey with a crystalline structure with a stony and glassy texture, considered highly fertile due to its wide presence. natural source of essential nutrients and minerals for the growth and proper development of plants. The region has a predominantly flat relief, with low slope, forming small elevations only in zones of erosion and fractures, between the various basalt flows in the region, with an altitude variance, between 220 and 840 meters above sea level. [27].

Regarding climate types, according to the Koppen model, the predominant climate in the Maringá region is the mesothermal humid subtropical with hot summer (Cfa), relatively humid in all seasons. Reaching average annual temperatures of 21°C, the highest temperatures occur during the months of November, December, January, February and March with a maximum average of 30°C and a minimum average of 13° in mid-July [3].

The forest vegetation in the Maringá region belongs to the domain of the Semideciduous Seasonal Forest (FES). Its development takes place on purple earth soils, being characterized by the formation of dense groupings with trees, vines and little undergrowth and by the partial loss of leaves from trees in the upper stratum of the forest. This happens due to the climatic influence in a certain period of the year that is drier and colder, which generally occurs in the coldest season [2, 10].

COLLECTION LOCATION

The remnants of the FES are found especially in the municipality of Maringá, with a total of 3.95% or 19.36 km² of native forest in the Municipality, as can be seen in the document of the Municipal Plan for the conservation and recovery of the Atlantic Forest of City Hall of Maringá [16] separated into 14.05 km² in the rural area and 5.31 km² in the urban area. Maringá has a total of 21 green areas, and this work is focused on 12 of them. Among all these areas, Bosque II, Parque do Ingá and Horto Florestal stand out as the three main remnants of the region.

FIELD AND LABORATORY PROCEDURES

At first, a survey was carried out on the Species link website [26] to find out which and how many species of Myrtaceae are found in the Semideciduous Seasonal Forest in the region of Maringá and to analyze which forest remnants are found in the family. An in-depth research was carried out for systematic knowledge of each species. Thus, a review of the material from the Herbarium of ``Universidade Estadual de Maringá`` (HUEM) was carried out with the aim of arranging updates in the nomenclature and reviewing the identifications made of the species of each record, in addition to two trips to the field in some forest fragments, in order to collect and analyze the distribution of species.

RESULTS AND DISCUSSION

Through the search carried out in Species link [26], 168 records were found, of which 16 were identified only at the genus level, another 20 only identified only the family.

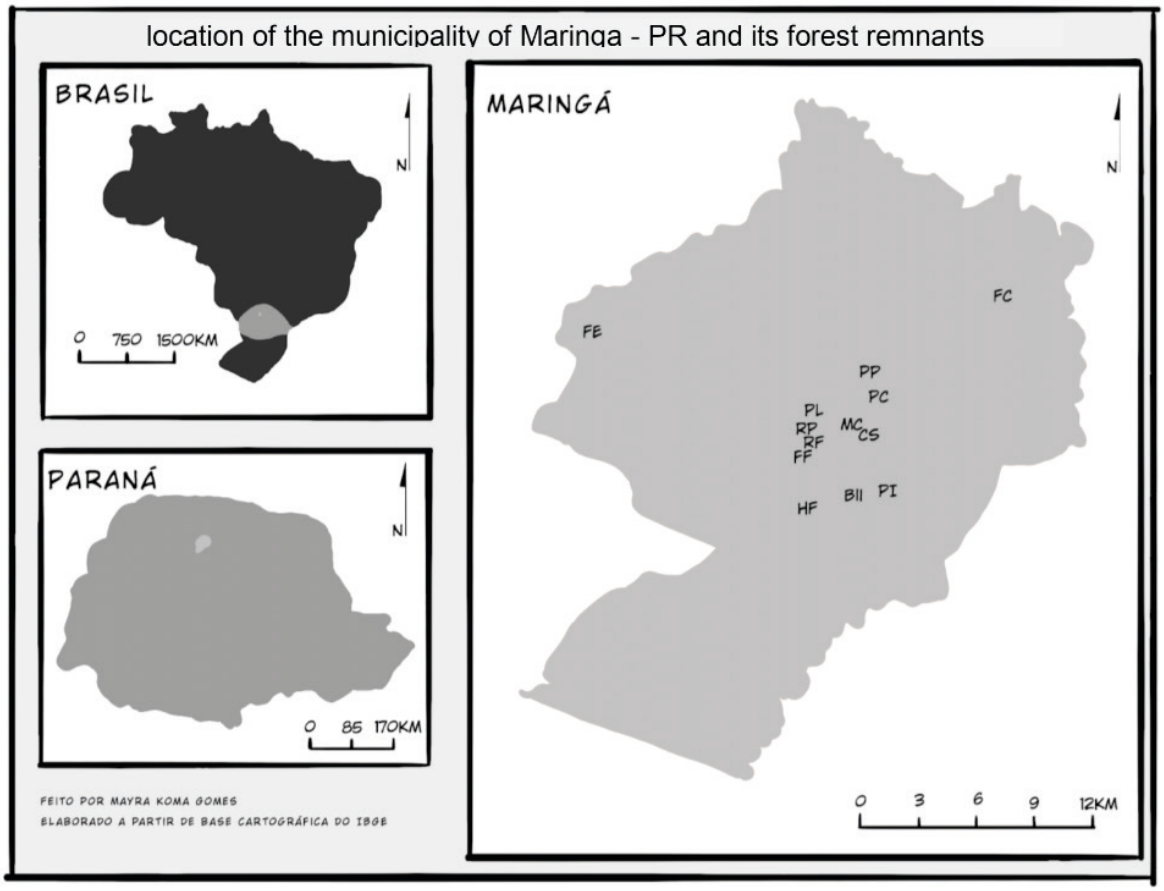

FIGURE 1: Location of the State of Paraná in Brazil. Location of the region of Maringá in the State of Paraná. Location of forest remnants in Maringá where collections of Myrtaceae were carried out, being BII: Bosque II; CS: UEM Headquarters Campus; FC: Cesumar Farm; FE: Experimental Farm of Iguatemi – UEM; HF: Horto Florestal Dr. Luiz Teixeira Mendes; MC: Ciliary Forest of UEM; PC: Cinquantenaire Park; PI: Ingá Park; PL: Gralha Azul Linear Park; PP: Parque das Palmeiras; RF: Rua Pioneira Deolinda T. Garcia Forest Reserve; RP: Forest Fragment Rua das Pombas.

In addition to these, there are 2 species in the HUEM, Eugenia paracatuana and Psidium cattleyanum, which make up the Semideciduous Seasonal Forest (FES) in the Maringá region, but which are not yet included in the registry [26]. Some records were present at HUEM to be analyzed in person and others were analyzed only through images present on the site [26], located in 12 remnants of FES in Maringá (Table 1).

After the revisions, 27 records were arranged for their identification at the species level and will later be updated on Species link [26]. We identified 28 species belonging to 10 genera (Callistemon, Campomanesia, Corymbia, Eugenia, Myrcia, Myrcianthes, Myrciaria, Plinia, Psidium and Syzygium), Eugenia being the most diverse, with 10 species. In addition, the genus Eucalyptus was also found, but this was removed from the data because it is a cultivated plant that is not native to the region of Maringá, and nothing concrete was found that would help in the identification of the species of this genus.

The species with the highest number of records are Eugenia uniflora, with 39 records, followed by Psidium guajava, with 18 and Syzygium cumini, with 15 records. Six species have only one record in the FES in the region of Maringá, with the least frequent species being Callistemon citrinus, Eugenia candolleana, Eugenia paracatuana, Myrcia felisbertii, Myrcianthes pungens and Psidium cattleyanum. Regarding the distribution of Myrtaceae in the forest remnants that make up the Maringá region (Table 1), it was possible to observe that of the 28 species, 12 occur in the Ingá park and another 12 occur in the Campus Sede UEM, being the areas with the highest occurrence. On the other hand, for Bosque 2, only two species were recorded, being the area with the lowest occurrence.

Among the species, the highest occurrence is that of Eugenia uniflora, distributed in 11 of the 12 green areas, followed by Psidium guajava, distributed in 8 areas, and Syzygium cumini, in 5. Another 13 species occur in only 1 place, being the less frequent species. (Table 1).

Regarding the reproduction period (Table 2), a greater number of flowering and/or fruiting was observed in the month of September, with 12 occurrences, followed by November, with 11 and October with 10, that is, these months are the ones that present greater diversity of food for wild animals and pollinators. The month of April had only 3 species in the reproductive period, being the month less favored by Myrtaceae.

Plinia peruviana and Psidium cattleyanum do not have data on their reproductive period because their collections and identification were only with vegetative material. Eugenia uniflora is the species with the longest reproductive period, with flowering and/or fruiting from March to November, totaling 9 months during the year (Table 2), being a very important source of food for pollinators [8].

Callistemon viminalis and Psidium guajava comes close behind as species with the longest reproductive period, both with 6 months during the year. These species collaborate with the ecosystem service because they are very important sources of food resources for pollinators, because they have vegetative material for a longer period of time throughout the year, guaranteeing fertilization and production of fruits and seeds.

Among the 28 species, only 2 do not have a popular name and 7 of these species present in the FES of the Maringá region (Eugenia brasiliensis, Eugenia candolleana, Eugenia longipedunculata, Myrcia felisbertii, Myrciaria glazioviana, Myrciaria glomerata and Psidium cattleyanum) are endemic species to Brazil [5] (Table 3).

Regarding the geographic distribution of the 28 Myrtaceae species that make up the

SPECIES	No	HUEM	COLLECTION PLACES											
			BII	CS	HR	FAI-TH	HF	MC	PRA-ÇA	IP	PL	PP	RF	PR
Callistemon citrinus(Curtis) Skeels	1	34129				X								
callistemon salignus (Sm.) Colv. ex Sweet	two	10189		X										
Callistemon viminalis(Sol. ex Gaertn.) G. Don.	7	34889		X										
Campomanesia guaviroba(DC.) Kiaersk.	4	23101			X		X		X			X		
Campomanesia guazumifolia(Cambess.) O. Berg	two	23097			X									
Campomanesia xanthocarpa(Mart.) O. Berg	8	6			X		X			X		X		
Corymbia citriodora (Hook.) KD Hills & LAS Johnson	3	34886		X		X								
Eugenia brasiliensis Lam.	3	4761		X			X							
Candollian Eugenia A.D.	1	31197											X	
eugenia florida A.D.	6	44			X		X						X	
Eugenia involucrata A.D.	two	12712								X				
Eugenia longipedunculata Nied.	8	35599			X		X			X				
eugenia paracatuana O.Berg	1	34215	X											
Eugenia pyriformis Cambess	9	30823		X						X				X
Eugenia ramboi D. Legrand	5	21980							X	X				
Eugenia repanda O. Berg	9	23421			X				X	X				
Eugenia uniflora L.	39	35171	X	X	X	X	X	X	X	X	X	X	X	
Myrcia felisbertii (DC.) O. Berg.	1	34194		X										
Myrcia splendens (Sw.) AD.	two	422				X				X				X
Myrcianthes pungens(O. Berg) D. Legrand	1	28479			X									
Myrciaria glazioviana (Kiaersk.) GM Barroso ex Sobral	two			X										
Myrciaria glomerata O. Berg	two	11713		X										
Plinia rivularis(Cambess.) Rotman.	two	8413								X				
Plinia peruviana (Poir.) Govaerts	two												X	X
*Psidium cattley anum*sabine	1													X
Psidium guajava L.	18	32706		X	X	X		X	X	X	X		X	
Syzygium cumini(L.) Skeels	15	32895		X		X		X		X	X			
Syzygium jambos(L.) Alston	3	35912		X						X				

Table 1 -Survey of Myrtaceae species in forest remnants that make up the region of Maringá. Where N: Number of specimens and BII: Forest II; CS: UEM Headquarters Campus; FC: Cesumar Farm; FE: Experimental Farm of Iguatemi – UEM; HF: Horto Florestal Dr. Luiz Teixeira Mendes; MC: Ciliary Forest of UEM; PC: Cinquantenaire Park; PI: Ingá Park; PL: Gralha Azul Linear Park; PP: Parque das Palmeiras; RF: Rua Pioneira Deolinda T. Garcia Forest Reserve; RP: Forest Fragment Rua das Pombas.

SPECIES	reproduction period											
	Jan	**Feb**	**Sea**	**apr**	**May**	**June**	**Jul**	**Aug**	**set**	**Out**	**Nov**	**Ten**
Callistemon citrinus (Curtis) Skeels								X				
callistemon salignus (Sm.) Colv. ex Sweet							X				X	
Callistemon viminalis(Sol. ex Gaertn.) G. Don.		X		X	X	X	X	X				
Campomanesia guaviroba(DC.) Kiaersk.										X	X	X
Campomanesia guazumifolia(Cambess.) O. Berg										X		
Campomanesia xanthocarpa(Mart.) O. Berg									X	X	X	
Corymbia citriodora (Hook.) KD Hills & LAS Johnson		X	X		X							
Eugenia brasiliensis Lam.								X	X			
Eugenia candolleana DC.			X									
Eugenia Florida DC.			X						X	X	X	
Eugenia involucrata DC.									X		X	
Eugenia longipedunculata Nied.							X	X	X	X		
Eugenia paracatuana O.Berg									X			
Eugenia pyriformis Cambess			X	X				X			X	X
Eugenia Ramboi D. Legrand					X					X	X	X
Eugenia Repanda O. Berg	X	X	X			X						
Eugenia uniflora L.			X	X	X	X	X	X	X	X	X	
Myrcia felisbertii (DC.) O. Berg.									X			
Myrcia splendens (Sw.) DC.								X			X	
Myrcianthes pungens (O. Berg) D. Legrand										X		
Myrciaria glazioviana (Kiaersk.) GM Barroso ex Sobral					X				X			
Myrciaria glomerata O. Berg					X	X						
Plinia rivularis (Cambess.) Rotman.								X				
Plinia peruviana (Poir.) Govaerts												
Psidium cattleyanum Sabine												
Psidium guajava L.	X							X	X	X	X	X
Syzygium cumini (L.) Skeels		X							X	X	X	
Syzygium jambos(L.) Alston			X						X			

Table 2 -Reproductive period of Myrtaceae species present in the Semideciduous Seasonal Forest in the region of Maringá. Being Jan: January; Feb: February; Sea: March; Apr: April; Mai: May; Jun: June; Jul: July; Aug: August; September: September; Oct: October; Nov: November; ten: december

Maringá region (Table 3), it is possible to observe that 26 species occur in the Brazilian Southeast region, which is the area with the highest occurrence of these species. As for the North region, only 9 species were recorded, making it the area with the lowest occurrence of these Myrtaceae species.

Of this total of 28 species, 7 species have a wide distribution, occurring in all regions of Brazil (North, Northeast, Midwest, Southeast and South), another 3 species, all of the genus Callistemon, have distribution in only one region [5].

Regarding the type of vegetation in which the species are found (table 4), it is possible to observe that 19 species occur in the Semideciduous Seasonal Forest (FES), being the vegetation with the most records. Next, with the occurrence of 18 species, is the Ombrophylous Rain Forest (FOP). Consisting of only 1 species, the seasonal deciduous forest (FED) and the várzea forest (FZ), are the vegetation types with the lowest occurrence of these species of Myrtaceae.

None of the species occurs in all Brazilian vegetation types, the species with the highest occurrence is Eugenia uniflora, being present in 9 of the 16 Brazilian vegetation types in which these species occur. No data were found on the vegetation type where the species Psidium guajava occurs. The acquired data were influenced by the low sampling amount of some species, with only 9 of the 28 species having more than 5 records.

With this floristic survey of Myrtaceae in the Semideciduous Seasonal Forest in the region of Maringá, Paraná, 28 species of the family were found, belonging to the genera Callistemon, Campomanesia, Corymbia, Eugenia, Myrcia, Myrcianthes, Myrciaria, Plinia, Psidium and Syzygium. Each species was analyzed below, separating them in alphabetical order by their genera, discussing their distribution in the different regions of Brazil, in the different biomes, and their different vegetation types. As well as presenting the potential uses that were found for each species and comparing the reproductive period recorded for Maringá-PR in this present work with those found in the bibliographic literature.

Callistemon citrinus (Curtis) Skeels: The bottlebrush or crimson brush is an ornamental shrub native to Australia [15]. It is used in some countries in forestry, essential oil production in weed control, in addition to showing potential use in antibacterial activities. [25]and also antioxidants [23]. Its geographical distribution is restricted to southern Brazil. Because it is not a native species from Brazil, there is not much data about the genus Callistemon. Only one record was found for the region of Maringá, this being from the UEM Experimental Farm of Iguatemi. This record was collected in August, being the only record of the reproductive period found for this species.

Callistemon salignus (Sm.) Colv. ex Sweet: Known as Calistemo-branco, for normally presenting its inflorescences in white, different from the common red characteristic of its genus, but the species can also be found in red. This species has only been recorded in the Southeast of the country [5]. In this present work, the species has two records for Maringá, both from Campus Sede UEM, but they present different reproductive data, with one in July and another in November.

Callistemon viminalis (Sol. ex Gaertn) G. Don.: The Red Callistemon, also called Bottlebrush by some authors, is an ornamental tree originally from Australia [15], which together with Callistemon citrinus has a slight potential of antimicrobial action [25]. Like the species Callistemon salignus, it also only has a geographic distribution in Southeast Brazil.

SPECIES	EN	POPULAR NAME	GEOGRAPHIC DISTRIBUTION				
			No	AT THE	CO	SU	s
Callistemon citrinus(Curtis) Skeels		Bottle brush					X
callistemon salignus (Sm.) Colv. ex Sweet		calisthemo-white				X	
Callistemon viminalis (Sol. ex Gaertn.) G. Don.		calisthemo-red				X	
Campomanesia guaviroba (DC.) Kiaersk.		Guabirobao da Ilha	X	X	X	X	X
Campomanesia guazumifolia (Cambess.) O. Berg		seven-cloak		X	X	X	X
Campomanesia xanthocarpa (Mart.) O. Berg		Gabiroba			X	X	X
Corymbia citriodora (Hook.) KD Hills & LAS Johnson		lemon eucalyptus	X	X	X	X	X
Eugenia brasiliensis Lam.	X	Ibaporoiti		X		X	X
Candollian Eugenia A.D.	X	Para plum		X	X	X	X
eugenia florida A.D.		cherry guamirin	X	X	X	X	X
Eugenia involucrata A.D.		big river cherry	X	X	X	X	X
Eugenia longipedunculata Nied.	X	Pitanga-orange				X	X
eugenia paracatuana O.Berg		-			X	X	X
Eugenia pyriformis Cambess		grapefruit			X	X	X
eugenia ramboi D. Legrand		white batinga				X	X
eugenia repanda O. Berg		Naked Fret			X	X	X
Eugenia uniflora L.		Surinam cherry		X	X	X	X
Myrcia felisbertii (DC.) O. Berg.	X	-		X		X	
Myrcia splendens (Sw.) AD.		Guamirim	X	X	X	X	X
Myrcianthes pungens(O. Berg) D. Legrand		Guabiju			X	X	X
Myrciaria glazioviana(Kiaersk.) GM Barroso ex Sobral	X	beach broom		X		X	X
Myrciaria glomerata O. Berg	X	red hairy	X				X
Plinia rivularis(Cambess.) Rotman.		Guaburiti	X	X	X	X	X
Plinia peruviana(Poir.) Govaerts		Jabuticaba-cabinho		X		X	X
*Psidium cattleyanum*sabine	X	yellow araçá		X		X	X
*Psidium guajava*L.		Guava	X	X	X	X	X
Syzygium cumini(L.) Skeels		jamboleiro	X	X		X	X
Syzygium jambos(L.) Alston		Yellow jambo		X	X	X	X

Table 3 -List of species recorded for the Semideciduous Seasonal Forest of the region of Maringá (HUEM) and their geographical distribution. EN: endemism in Brazil; Distribution in Brazil – N: North; No: Northwest; S: South; SU: Southwest; CO: Midwest.

SPECIES	VEGETATIONAL TYPE
Callistemon citrinus (Curtis) Skeels	FES
Callistemon salignus (Sm.) Colv. ex Sweet	FES
Callistemon viminalis(Sol. ex Gaertn.) G. Don.	FES
Campomanesia guaviroba(DC.) Kiaersk.	EC, FES, FOM, FOP
Campomanesia guazumifolia(Cambess.) O. Berg	EC, CT, FC, FES, FOM, FOP
Campomanesia xanthocarpa (Mart.) O. Berg	FES, FOM, FOP
Corymbia citriodora (Hook.) KD Hills & LAS Johnson	AA
Eugenia brasiliensis Lam.	FES, FOM, FOP, RE
Candollian Eugenia A.D.	AR, CA, CR, FOP
eugenia florida A.D.	CT, CE, FES, FOP, FZ
Eugenia involucrata A.D.	AIR, CA, CE, CR, EDF, FES, FOM, FOP
*Eugenia longipedunculata*Nied.	FES, FOP
*eugenia paracatuana*O.Berg	CE, FES, FOP
Eugenia pyriformis Cambess	CE, FES, FOM
eugenia ramboi D. Legrand	FES, FOM, FOP
eugenia repanda O. Berg	FC, FES, FOM, FOP
Eugenia uniflora L.	AA, AR, CE, FC, EFF, FES, FOM, FOP, RE
Myrcia felisbertii (DC.) O. Berg.	FOP
Myrcia splendens (Sw.) AD.	CE, CR, FC, EFF, FES, FOP
Myrcianthes pungens (O. Berg) D. Legrand	CE, CR, FC, FES, FOM
Myrciaria glazioviana(Kiaersk.) GM Barroso ex Sobral	FOP, RE
Myrciaria glomerata O. Berg	FES
Plinia rivularis(Cambess.) Rotman.	FES, FOM, FOP
Plinia peruviana(Poir.) Govaerts	FOM, FOP
*Psidium cattleyanum*sabine	CE, FOM, FOP, RE
Psidium guajava L.	-
Syzygium cumini(L.) Skeels	AA
Syzygium jambos(L.) Alston	AA

Table 4 -Relationship between Myrtaceae species and the respective types of vegetation in which records were found [5] AA: anthropic area; AR: rocky outcrops; CA: altitude field; CE:savannah; CR: rupestrian field; CT: caatinga; FC: riparian forest; EDF: seasonal deciduous forest; FEP: evergreen seasonal forest: FES: semideciduous seasonal forest; FOP: rainforest; FOM: mixed rain forest; FZ: lowland forest; RE: sandbank.

Callistemon viminalis is the species within the genus Callistemon with the most records for Maringá, with 7 records and with that a broader record of its reproductive period, which was recorded in February and again from April to August.

Campomanesia guaviroba (DC.) Kiaersk.: Known as Guabirobão-da-ilha, it is geographically distributed throughout Brazil, covering the North, Northeast, Midwest, Southeast and South of the country [5]. It usually occurs in the Atlantic Forest, its wood can be used in the production of various items such as musical instruments. Its fruits are edible, being food for several animals. The reproductive period seen in this work is compatible, records being found in October, November and December, just not found in January.

Campomanesia guazumifolia (Cambess.) O. Berg: Popularly known as Sete-capotes, it is widely distributed in Brazil, not only present in the North area [5]. Fruit maturation can occur from January to May [7]. Part of his study is that Sete-capotes fruits have an ethanolic extract that can be extracted and has bactericidal and fungicidal potential. The fruits are consumed in natura and in the form of homemade sweets, because in addition to being tasty they have a good nutritional value, which compared to Gabiroba, Guavira, Apple and Guava, have greater amounts of potassium, calcium and iron. In the present work, its reproductive period was only recorded in October, but this may be due to the fact that the species has only two specimens collected in Maringá.

Campomanesia xanthocarpa (Mart.) O. Berg: Gabiroba, occurs in the Midwest, Southeast and South regions of the country [5]. Its usefulness ranges from the use of wood in the manufacture of musical instruments to the use of its fruits in the preparation of liqueurs, being widely cultivated in gardens. In this work, Campomanesia xanthocarpa presented data from the reproductive period in September, October and November.

Corymbia citriodora (Hook.) KD Hills & LAS Johnson: Popularly called Eucalyptus-lemon, it has a geographic distribution covering the entire Brazilian territory. From its leaf it is possible to produce biosynthesized nanomaterials which can be used in the pharmaceutical field and in clinical trials [32]. Corymbia citriodora blooms in Australia between June and November [1], however it was found for Maringá the record of flowers and fruits in February, March and May.

Eugenia brasiliensis Lam.: Ibaporoiti is an endemic species of Brazil, with geographic distribution in the Northeast, Southeast and South of the country [5]. In this present work we found reproductive data for August and September. This species has potential for use in lathe work, joinery, carpentry, ceilings, among other uses for its wood, in addition to being widely cultivated for its fruits, it is also used in landscaping and afforestation since it has a small and narrow crown making of Eugenia brasiliensis a good species to be planted in narrow streets and under electrical networks.

Candollian Eugenia DC.: Plant popularly known as Plum of Pará, is endemic to Brazil and can be found in the Northeast, Midwest, Southeast and also in a part of the South of the country, contemplating the biomes of Caatinga,savannah and Atlantic Forest [5]. This species can have semideciduous, heliophyte or sciophyte characteristics and hygrophyte selective (such as partial leaf drop, preference for intense light but also like shade and deal well with high humidity). They

prefer moist soils. For the Maringá region, the reproductive period found is only March, but it is important to emphasize that this data does not show other months because this species has only one record present in the herbarium for this region. Eugenia candolleana is found in orchards because its fruits are fleshy and juicy, can be used in mixed reforestation and urban afforestation. The species is also being studied for its potential against Aedes aegypti mosquito larvae.

Eugenia florida DC.: Called cherry Guamirim, it occurs in all regions of the country [5]. Among its potential uses, it has an antioxidant, cytotoxic and antiproliferative effect against chronic myeloid leukemic cells from its leaves [24]. It can be used in small buildings, tool handles, crates, rustic furniture and heterogeneous reforestation as it is consumed by several species of birds. This species flowers more than once a year, but it has a predominance of flowering between the months of August and September and fruiting in December and January. For the Seasonal Semideciduous Forest in the region of Maringá, flowering and fruiting were recorded in March and subsequently from September to November, deviating somewhat from the predominance mentioned above.

Eugenia involucrate DC.: Known as Cereja-do-rio-grande, its geographical distribution is wide and covers the entire Brazilian territory [5]. In the present work its reproductive period was recorded for September and November. Its reproductive period is fast, occurring in October, November and December [4], its fruit is said to be tasty and juicy, but it is difficult to find anyone who sells it because it perishes easily after harvesting and already on its cultivation in orchards, it is not used as much as the others. species for this one presents a slower growth and will produce fruits after about five years. Its potential use is more concentrated in the processed form of the fruit such as jellies, juices, ice cream and liqueurs, but with more studies it has potential in the manufacture of cosmetics.

Eugenia longipedunculata Nied: Popularly known as Pitanga-laranja, it is an endemic plant in Brazil and can be found mainly in the South and Southeast regions [5]. It was more difficult to find data on this species in articles and books, the reproductive period found in this work was from July to October.

Eugenia paracatuana. Berg: This plant is sometimes called in the indigenous culture Cuxita or Pitangão Azul, mentioned in some sites by Guamirim de Sombra and other names, but not having a popular name in fact. This plant is geographically distributed in the Midwest, Southeast and South of Brazil [5]. This species has the potential to use its organic extractives (OrgExt) due to its low toxicity and remarkable antimicrobial activity [31]. Due to the low number of records of this species in the FES of Maringá, only one specimen collected in Bosque II, we only have records of the reproductive period in the month of September.

Eugenia pyriformis Cambess: Uvaia is geographically distributed in the Midwest, Southeast and South of the country [5]. According to the Ministry of the Environment [17] its reproductive period is the one that varies most among the other species, being from December to February in Pelotas-RS, August to September in Jaboticabal-SP and adding in this present work the months of March, April, August, November and December found in this region of Maringá-PR. Its main use is the consumption of its slightly sour and refreshing fruits used in juices, ice cream, jellies and sweets, in addition to its

consumption in natura [17].

Eugenia rambo. Legrand: The plant popularly known as Batinga-branca, occurs in the country in parts of São Paulo and in the southern area, being from the phytogeographic domain of the Atlantic Forest, this species also occurs in other countries [5]. It has evergreen, heliophyte or sciophyte characteristics. It has potential for use in internal works, and is also used in reforestation and landscaping. In the present work it was analyzed that for the region of Maringá the reproductive period of Eugenia ramboi consists of the months of May and of October to December.

Eugenia repanda. Berg: This species is evergreen, heliophyte or sciophyte and selective hygrophyte. In this work, reproductive materials were found from January to March and later in June for Maringá-PR. Popularly known as Traste Pelado, it is not endemic to Brazil and can be found throughout the country in the Midwest, Southeast and South regions, being part of the phytogeographic domain of the Atlantic Forest [5].

Eugenia uniflora.: The Pitangueira plant, occurs in all regions of Brazil with the exception of the North region [5]. It has fruit maturation from August to February in general, but for the South and Southeast regions of Brazil, its fruiting may occur between April and July [4]. For Maringá, Eugenia uniflora occurs throughout the period from March to November, being the species with the highest number of records and present in practically all places where collections were carried out. This variation is due to the phenology of the Pitangueira being influenced by the climate. Its use ranges from the consumption of its fruits in natura and in cooking to a popular medicinal use as a calming, diuretic and aid in the fight against diarrhea and fever. The Pitanga tree can also be used in landscaping, but the fall of its fruits can be an inconvenience.

Myrcia felisbertii (DC.) O. Berg: Plant endemic to Brazil, no record of a possible popular name was found, according to the website World Checklist of Selected Plant Families [28], this plant is only found in northern Brazil, but the Flora do Brasil website [5] records it being present only in the Northeast and Southeast of the country. It is a little-known species and its flowering and fruiting times have not been studied so much, nor its possible potential uses. For Maringá only one record was found dating that in the month of September reproductive material of this species was found.

Myrcia splendens (Sw.) DC: The plant known as Guamirim-miúdo, has its geographical distribution throughout all Brazilian regions [5]. And it has been studied for its importance as a potential source of antioxidant compounds that can be commercially applied in the future [21]. In this current floristic survey of Myrtaceae from the FES of Maringá-PR, we saw that Myrcia splendens presents a reproductive period in August and later in November.

Myrcianthes pungens (O. Berg) D. Legrand: Known as Guabiju, this plant is present in the Midwest, Southeast and South of the country, and can occur both in the phytogeographic domain of the Atlantic Forest and thesavannah [5]. This species has some other popular names such as guajaraí-da-várzea and guavira-guaçu. This species can reach fifteen to twenty meters in height and has a wood that is considered heavy, compact and quite elastic. Its tasty fruits make Myrcianthes pungens cultivated in domestic orchards, being also appreciated by several

animals, mainly birds. Another important factor of this species is that its flowers are melliferous.

Myrciaria glazioviana (Kiaersk.) GM Barroso ex Sobral: The plant known by the popular name Vassourinha-da-praia, is an endemic plant in Brazil and has its geographical distribution in the Northeast, Southeast and South of the country, being contemplated only in the phytogeographic domain of the Atlantic Forest [5]. Myrciaria glazioviana occurs mainly in stony soils with high humidity. The data obtained from the reproductive period for the Maringá region were the months of May and the month of September. The plant has a dense and low canopy, and its fruits are edible, which is why it is cultivated in domestic orchards.

Myrciaria glomerata. Berg: The red-haired, is another of the endemic species of Brazil, occurring only in the extremes, in the North and in the South of the country, it can be found in the phytogeographical domains of the Amazon and the Atlantic Forest. Typical of Semideciduous Seasonal Forest (FES), not being recorded in other types of vegetation [5]. The plant is little known, so it is not easy to find it for sale at fairs and markets. Here for the region of Maringá, two records of this species were found, both from Campus Sede UEM, and with the reproduction period of May and June.

Plinia rivularis (Cambess.) Rotman: The species known as Guaburiti, is a plant native to Brazil and occurs in other countries, such as Argentina. Its geographical distribution encompasses the whole of Brazil, but it is scarcer in the Midwest because it is present only in the state of Mato Grosso do Sul. It is a plant present in several phytogeographic domains, such as the Amazon, the Caatinga, thesavannah and the Atlantic Forest. In addition to the FES, this plant can be found in the vegetation types of Rainforest and Mixed Rainforest [5]. In the FES of Maringá, more specifically in Parque do Ingá, two specimens are registered with the reproductive period only in the month of August.

Plinia peruviana (Poir.) Govaerts: Known as jabuticaba-cabinho, or also in its translated form of being known in other countries as "uva-brasileira", it is one of the species in the present work that are best known and appreciated in Brazil, native, used in landscaping and domestic orchards and commercially, present in the country's folklore, the fruits are consumed directly from the tree and are also used in juices, wines, sweets, among several other drinks and foods, and can even be used in finer dishes like sweet and sour sauce or mousse. Its reproduction varies, but it is concentrated between October and December, and it can have more than one fruiting per year [17]. For Maringá, two collections of Plinia peruviana were registered, one in the Forest Reserve of Rua Pioneira Deolinda T. Garcia and the other in the Fragmento Florestal Rua das Pombas, Unfortunately, both only have vegetative material so there is no data on the reproductive period of this species in the Maringá region.

Psidium cattleyanum: Araçá-amarelo, or also known as simply araçá or araçá-de-crown, is an endemic species of Brazil, which has its geographical distribution in the Northeast, Southeast and South of the country. It includes the phytogeographic domains of the Caatinga,savannah and Atlantic Forest [5]. For southern Brazil, its natural reproductive period was recorded between October and March, but in cultivation there may be three distinct periods of flowering: from September

to October, December and another in March [17]. With only one specimen of Psidium cattleyanum in the herbarium for the region of Maringá and this only presents vegetative material, as well as Plinia peruviana, there is no date for the flowering and fruiting of the species in the region.

Psidium guajava.: The popular Goiaba is a naturalized plant, widely known in Brazil, present in culture, for example in the comics of Chico Bento, a character created by the Brazilian cartoonist Maurício de Sousa. Geographically distributed throughout the country. It is present in the phytogeographic domains of the Amazon, the Caatinga, thesavannah, the Atlantic Forest and the Pampa, that is, it is just not found in the Pantanal Biome [5]. Present in more than half of the FES collection sites in Maringá-PR, this species has a wide reproductive period from August to January, Psidium guajava has a large number of collection records for this region, second only to Eugenia Uniflora.

Syzygium cumini (L.) Skeels: Plant with the most popular name Jamboleiro, has other popular names such as olive-sweet, cherry, jamelão and jambolão, it is present in all regions of Brazil with the exception of the Midwest, and is considered to be present only in the type vegetation in an anthropic area [5]. Native to India and widely distributed from Asia to North Queensland [28]. With its flowering period in India being from October to May it is an important plant in their beekeeping [22]. For Maringá-PR, its reproductive period that has been registered until the present work is from February, and then from September to November. Syzygium cumini is the third plant with the most records in the Maringá region, behind only Eugenia uniflora and Psidium guajava.

Syzygium jambos (L.) Alston: Plant popularly known as Jambo-amarelo, it has its geographical distribution in all regions of the country, with the exception of the North [5]. This species has considerable potential for use as an antiulcer and antioxidant, as tested in the study the use of its leaf extract for the prevention of gastric lesions in rats [9]. In the present floristic survey of Myrtaceae in Semideciduous Seasonal Forest, the reproductive period was observed in March and later in September.

FINAL CONCLUSIONS

The floristic survey of Myrtaceae in Semideciduous Seasonal Forest in the region of Maringá-PR took place according to records of plants collected in Bosque II, Campus Sede UEM, Fazenda Cesumar, Fazenda Experimental de Iguatemi – UEM, Horto Florestal Dr. Luiz Teixeira Mendes, Ciliary Forest of UEM, Cinquentenário Park, Ingá Park, Gralha Azul Linear Park, Palmeiras Park, Forest Reserve of Rua Pioneira Deolinda T. Garcia and the Forest Fragment Rua das Pombas. In which 28 species of the family are registered, being of the genera: *Callistemon (C. citrinus, C. salignus, C. viminalis), Campomanesia (C. guaviroba, C. guazumifolia, C. xanthocarpa), Corymbia (C. citriodora), Eugenia (E. brasiliensis, E. candolleana, E. florida, E. involucrata, E. longipedunculata, E.paracatuana, E. pyriformis, E. ramboi, E. repanda, E. uniflora), Myrcia (M. felisbertii, M. splendens), Myrcianthes (M. pungens), Myrciaria (M. glazioviana, M. glomerata), Plinia (P. rivularis, P. peruviana), Psidium (P. cattleyanum, P. guajava)* and *Syzygium (S. cumini, S. jambos)*. All Myrtaceae species showed a different degree of importance, in addition to feeding a variety of wild animals. Even more so with 7 of these species being endemic to Brazil *(Eugenia brasiliensis, Eugenia candolleana,*

Eugenia longipedunculata, Myrcia felisbertii, Myrciaria glazioviana, Myrciaria glomerata e Psidium cattleyanum), these plants must be protected from future deforestation, requiring the preservation of these remnants, as well as facilitating access to researchers so that more collections can be carried out in the remnants in order to have a greater amount of samples of each species.

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